



## University Students Planning a Project that Challenges Sighted School Students to Develop Botanical Activities for Blind Students

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### Abstract

*A long-term project planned by Biology Graduation Students and the supervising Teacher, both incorporated to a government project of teaching initiation (PIBID) aimed to stimulate the school students of Colégio Pedro II as active agents in the complete process, challenging them to experience some of the difficulties lived by blind students and to think about alternative methods to facilitate the learning of some botanical concepts. As a trigger, they experienced in pairs a guided olfactory and tactile tour in the local Botanical Garden, in which one student remained blinded and the other acted as guide. The ideas presented by these students based on their experience were discussed and approved by the whole group. Each student chose one of the approved projects to research, develop and implement. One of the interesting results of this process is a cooperative activity that privileges the sense of touch, approaching concepts that initially were inaccessible by this sense. As the explanation about a concept or object is presented by a person without blindness, the model is simultaneously constructed in play dough by a blind one. This explanation can be adapted throughout the construction of the model. If the explanation alone is not enough, the person without blindness can interfere in the model construction so that the blind person understands more accurately what is being presented. This strategy is a way to facilitate more accurate explanations such as size, proportion, position of structure, shape, among others. Another advantage is the possibility to realize eventual conceptual errors during the process, instead of at the end of the explanation, allowing an immediate interference, still during the construction phase of the mental model. The group was able to attest in an evaluation analysis that the school students considered the process interesting and useful. Finally, it was possible to observe the conceptual and experience gain that both, school students and those of the university, obtained during this process, as the development of socio-emotional skills of empathy with blind students, and perception of another being, and the shaping of more careful future teachers about these issues, breaking paradigms already established.*

**Keywords:** *blind students, relation university school, model creation, cooperative activity*

### 1. Introduction

Changes in forms of knowledge accessibility over the last few years have led to a reduction of purpose and interest in formal education. Knowledge that previously depended solely on the school to be studied, today is accessible by various technological means. This scenario leads to many discussions in academic fields about which strategies are useful for capturing the students' attention, their intellectual and emotional involvement with school knowledge, and the achievement of a meaningful learning. In active teaching methods, unlike traditional ones, students are responsible for their own education and it is up to the teacher to encourage and facilitate the process. Even if often fewer subjects are approached in the same amount of time, empirical studies point to a deeper understanding and a better appropriation of the concepts, allowing students to use this knowledge more efficiently [1].

The fact that current teachers were educated immersed in traditional teaching methods is an obstacle to the implementation of active learning. With that in mind, the training of new teachers in these active methodologies becomes a necessity.

The Institutional Program for Scholarships for Initiation in Teaching (PIBID) is a Brazilian federal program for undergraduate students in courses directed for training basic education teachers [2]. The

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activities of this program are carried out outside the university, in public education schools, and allow the future teachers to experience the challenges of working in public schools and offer the possibility for both undergraduate students and teachers to think and experiment new strategies.

PIBID operates through bilateral agreements between universities and basic schools. The work of this article was elaborated by a partnership signed between the Federal University of Rio de Janeiro (UFRJ) and the Colégio Pedro II (CPII), a federal public school. Five undergraduate students from the Biology Program of UFRJ, together with a CPII supervisor and professors from UFRJ, planned extracurricular activities in Biology that were put to practice on a small group of CPII high school students.

Among the challenges in Science education in Brazil, we can point out the discussions about the advantages and disadvantages of including students with special needs in mixed classes, taking into account the learning impacts for students with disabilities as well as other students and the possible challenges for the teacher in the management of a mixed class [3]. Brazilian legislation requires, whenever possible, a priority to integrate students with special needs into classes formed by those without such needs.

A project aiming an active involvement of the school students in the elaboration of activities that facilitate the learning of Botanical concepts for blind students was implemented. The focus was trying to allow an identity and experience approximation between the students, to link the school contents and knowledge produced in a cultural, social and emotional context and to overcome traditional barriers existed in activities carried out in classrooms (Fig. 1).

The occurrence of this kind of pedagogical practices in daily school life is useful to encourage students without blindness to empathize towards their colleagues with low or no vision.

## 2. The Project

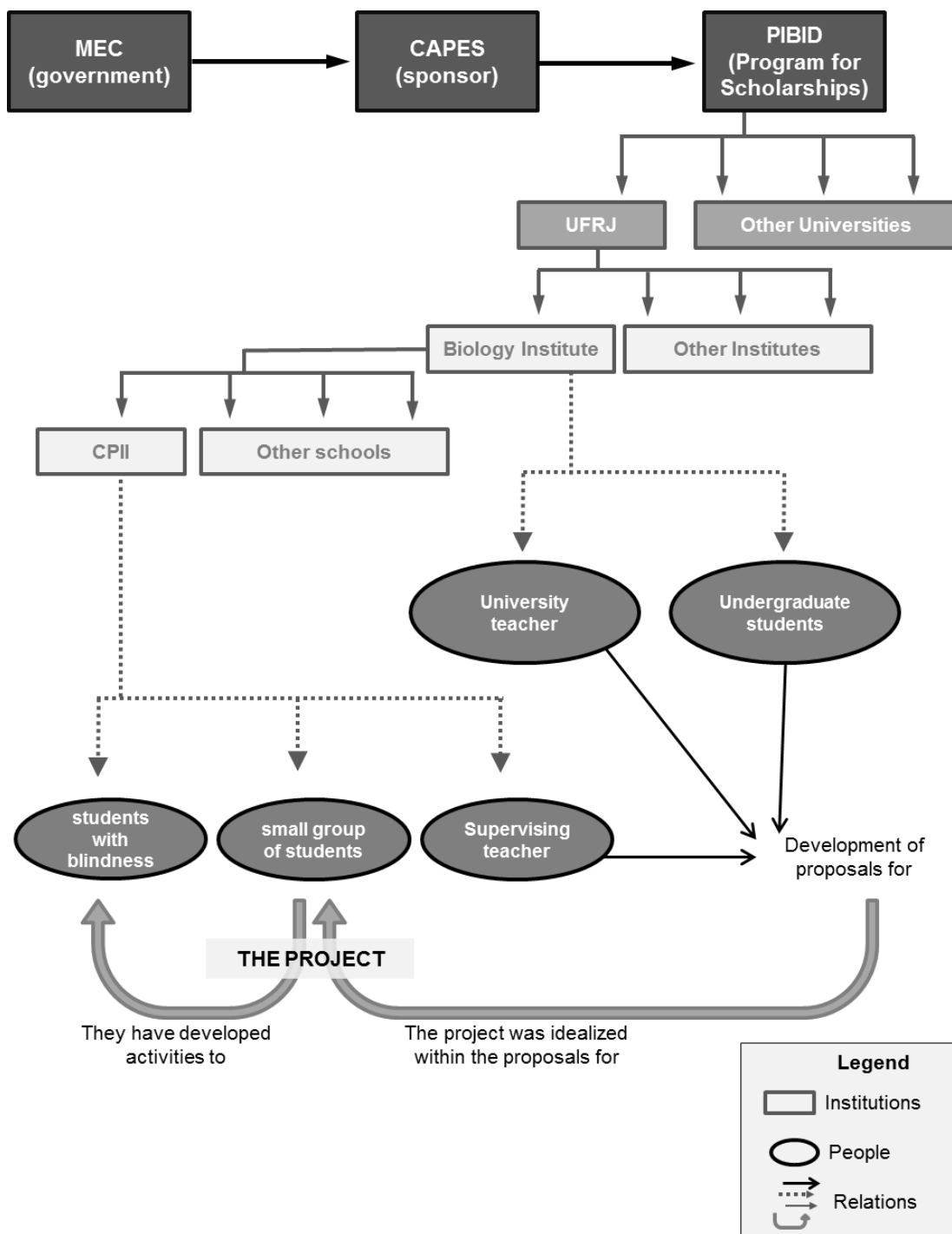
In 2015, a long-term project planned by undergraduate students aiming to stimulate a group of school students to act as active agents in the process of acquisition and transmission of knowledge. They were challenged to experience some of the difficulties faced by blind students of the same school and to think of alternative methods to facilitate the learning of some botanical concepts.

During the months of planning, it was necessary to look for strategies so that, in the process, the school students would become protagonists and the undergraduate students would act as mediators. For this, it was essential to exchange information and knowledge among professionals of different specialties and to visit the Botanical Garden of Rio de Janeiro and the CPII's Didactic Garden. One of the intentions was to identify aspects of biological interest that could be assigned to the school students: species with high volatile aromatic substances and species of easy tactile distinction were considered in the planning of a guided tour for a trigger activity.

During the activity in the Botanical Garden, the school students were separated in pairs and while one of them was blindfolded his pair guided him through the vegetation presenting floral chalice or crumpled leaves to his nose, guiding his hands to the textures of the trunks or to leaf shapes and fruits. The challenge for blindfolded students was to understand information about these plants, and for the guides the challenge was to be able to present all the aspects, including the ones that could not be captured by touch or smell.

The outcomes from the activity were ideas that were presented in a circle of discussion and some were approved by the whole group. From then on, each student chose one of the approved ideas to research, develop and implement in smaller groups.

The ideas researched resulted in some interesting products, such as a cooperative activity that privileges the sense of touch, approaching concepts that were initially inaccessible by this sense, culminating a workshop entitled "seeing with hands".



**Fig. 1:** Relationships between the people and institutions involved in the project.

## 2.1 Evaluation analysis

Out of a total of 31 students who took part in the activities, it was possible to apply an anonymous questionnaire with 26 students (11 boys and 15 girls) between 15 and 18 years old to evaluate the project proposal as a whole and two key stages. The first one was related to the trigger activity and ideas discussed and the second stage evaluated was related to the conditions and possibilities of development and application of the ideas in the CPII Garden. The questionnaire evaluated the students' opinions regarding the importance of the proposal of the project and the level of involvement in the activities and, in relation to the two stages, evaluated according to the level of interest, whether they considered it instructive and ludic. We classified the answers as positive or negative according to table 1.



**Table 1:** Positive or negative ratings of the items assessed by the students through an anonymous questionnaire.

		LEVELS FOR RATING	
TARGET	ITEM	Positives	Negatives
Whole Project	Importance of the project	<i>Very interesting or interesting</i>	<i>Mildly interesting or not interesting</i>
	Level of involvement	<i>Very high, high or moderate</i>	<i>Little or none</i>
Specific stage	Ludic	<i>Much fun or fun</i>	<i>Mildly fun or boring</i>
	Interest	<i>Very interesting or interesting</i>	<i>Mildly interesting or not interesting</i>
	Instruction	<i>Very instructive or instructive</i>	<i>Mildly instructive or didn't add</i>

All the analyzed items obtained a high index of positive evaluation (table 2), pointing that not only did the students considered the project important and instructive, but also entertained themselves and promoted a high degree of involvement.

**Table 2:** Absolute number and percentage of students who evaluated the project as a whole and the first (S1) and second stages (S2).

Evaluation	WHOLE PROJECT		STAGES					
	Importance	Level of involvement	Ludic		Interest		Instructive	
			S1	S2	S1	S2	S1	S2
<b>Positive</b>	22 (91,7%)	24 (92,3%)	14 (93%)	12 (75,0%)	16 (100%)	13 (81,3%)	15 (100%)	14 (88,5%)
<b>Negative</b>	2 (8,3%)	2 (7,7%)	1 (6,7%)	4 (25,0%)	0 (0%)	3 (8,7%)	0 (0%)	2 (12,5%)

## 2.2 “Seeing with hands”

One of the ideas developed and worked out by the group of school students was a cooperative activity performed in pairs, in which the blind participant receives a play dough and the student without blindness describes him a concept or object. As the explanation is presented, the model is simultaneously constructed in the play dough. This simultaneous act allows the speech to be adapted throughout the construction of the model.

The person without blindness may interfere directly with the construction of the model, whenever needed, so that the blind person understands more precisely what is being presented. This strategy is a way to supply more precise explanations of concepts, such as size, proportion, position of structure, shape, among others.

It is interesting to note the many possibilities of intervention in the construction during the teaching-learning process within the activity. We can realize and distinguish the difficulties in the comprehension of the concept or object during its construction by the student. In addition, this moment of active participation in his own teaching-learning process is very enriching for both, the blind student and the ones without blindness.

## 3. Conclusion

In this scenario it is natural to think that the main target audience of the project were the blind students, however, the focus was the students without blindness that developed, planned, remodeled, tested and executed the activities, all mediated and supervised by university students and the CPII teacher.

It was possible to observe the conceptual and experience gain that both, school students and those of the university, obtained during this process, as the development of socio-emotional skills, empathy with blind students, and perception of another being, and the shaping of more careful future teachers about these issues, breaking paradigms already established.

The individuals who accept the challenge of teaching must be prepared to never be fully trained to deal with all the challenging situations they will come across. Instead of a reason for stagnation, these obstacles can serve as a motivational trigger in the pursuit of innovations and improvement.



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